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ABSTRACT

Adolescent engagement in risk-taking and life-compromising behaviors has become a public health concern. This paper describes the development of three alternate forms of a new scale to measure suicidal and risk-taking behavior, the Life Attitudes Schedule (LAS). The LAS, which was developed and piloted on 1,539 high-school students and young adults, is based on a broad conceptualization of suicidal behavior. It is unique because it is derived from a broad theoretical perspective. The LAS measures four different content categories: (1) death-related; (2) health-related; (3) injury-related; and (4) self-related. Each content category includes an equal number of items designed to assess actions, thoughts, and feelings. The LAS was designed to measure a bipolar continuum of behavior; consequently, an equal number of positive (life-enhancing) and negative (life-compromising) items are included. Three approaches were used to evaluate the validity of the LAS: correlational analyses, construct and criterion validity analyses, and structural equation modeling to test several theoretical models underlying the LAS. The results indicate both that this instrument has excellent reliability and validity properties and provides validation of the construct of life-compromising and life-enhancing behaviors. Six tables present sample items and statistical summaries. Contains 40 references. (Author/RJM)

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The Life Attitudes Schedule:
A theoretically derived scale to assess adolescent life-enhancing, life-compromising, and suicidal behaviors

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Abstract

This paper describes the development of a new scale to measure suicidal and risk-taking behavior, the Life Attitudes Schedule (LAS). The LAS, which was developed and piloted on 1,539 high school students and young adults, is based on a broad conceptualization of suicidal behavior. The schedule measures four different content categories: death-related, health-related, injury-related, and self-related. Each content category includes an equal number of items designed to assess actions, thoughts, and feelings. The LAS was designed to measure a bipolar continuum of behavior; consequently, an equal number of positive (life-enhancing) and negative (life-compromising) items are included. The results indicate both that this instrument has excellent reliability and validity properties and provides validation of the construct of life-compromising and life-enhancing behaviors.

The Life Attitudes Schedule: A theoretically derived scale to assess adolescent life-enhancing, life-compromising, and suicidal behaviors

Adolescent engagement in risk-taking and life-compromising behaviors has become a public health concern. Adolescent suicidal behavior in particular and risk-taking behaviors in general appear to be increasing in recent years (e.g., Scott & Cabral, 1988). Suicide is currently the second most frequent cause of death for adolescents 15 to 24 years of age, and accidents, which are frequently associated with risk-taking behaviors and substance use, are the leading cause of death in this age group (National Center for Health Statistics, 1991). As yet another indicator of the high rate of risk-taking in teenagers, the rate of AIDS, which is often a consequence of behaviors such as unprotected sexual intercourse, IV drug use, and the use of substances which reduce inhibitions, is thought to be doubling each year in adolescents (Biglan et al., 1990; Brooks-Gunn, Boyer, & Hein, 1988). It is important to understand the etiology of these behaviors (Irwin & Millstein, 1986), as well as identify better methods of assessing youth who are at high risk for suicidal or potentially life-threatening behaviors. Consequently, in this paper, we report on the development of three parallel versions of a new instrument, the Life Attitudes Schedule (LAS). The LAS was designed on the basis of a theoretical model to identify adolescents at risk for engaging in

a broad array of potentially life-compromising and life-enhancing behaviors.

Psychometrically sound instruments are necessary to aid in the prediction and prevention of suicidal and life-compromising behaviors. However, in a recent review of the available assessment devices (Garrison, Lewinsohn, Marsteller, Langhinrichsen, & Lann, 1991; Lewinsohn, Garrison, Langhinrichsen, & Marsteller, 1989), we concluded that current instruments have a number of limitations and conceptual concerns. First, researchers vary widely in their definition of suicidal behavior. Some suicide researchers measure related constructs such as depression and hopelessness (e.g., Beck, Weissman, Lester, & Trexler, 1974; Harter & Nowakowski, 1987), while others choose to define the construct broadly, including behaviors such as accident-proneness, unnecessary risk-taking, asceticism, polysurgery, behavior leading to victimization, and even the failure to engage in behaviors that serve to protect one's life or reduce the probability of death or injury. More narrow definitions of suicidal behavior restrict the construct to behaviors that lead to immediate death (e.g., drug overdose) or at least serious self-injury (e.g., cutting oneself or self-mutilation).

The variety of often implicit theoretical models underlying these measures has made the comparison of available instruments difficult. For example, all the following terms are currently

recognized within the field and represent the range of behaviors that can be assessed: completed suicide (consciously ending one's life); attempted suicide (similar to completed suicide in that intentional conscious actions have taken place; however, they did not lead to death); suicide gesture or parasuicidal behavior (a symbolic act that is not actually life-threatening); suicide threat (saying or doing something that indicates a self-destructive desire); and suicidal ideation (thoughts about killing oneself).

A second limitation we noted was that the vast majority of the current instruments suffer from inattention to validity issues. Where validity has been assessed, it has often been limited to correlating the new instrument with measures of related constructs such as depression and hopelessness (e.g., Pfeffer, Solomon, Plutchik, Mizruchi, & Weiner, 1982; Pfeffer, Zuckerman, Plutchik, & Mizruchi, 1984). In our initial work, expected relations between the LAS scores and measures of depression and hopelessness were found. Thus, we did not expect to be able to create a scale that was completely unassociated with these constructs. However, we believe that more needs to be done to establish construct validity and to determine the unique aspects of the domain of suicidal behavior as assessed by the instrument, as well as its discriminate and criterion validity. Finally, many of the existing instruments have not been given to a large enough number of adolescents to establish item

reliability, item to scale relations, and age and gender scale norms.

On the basis of our review of the literature we concluded that there continues to be a need for a reliable and valid assessment device that can efficiently identify adolescents at risk for suicidal behavior. Ideally, this scale should include a broad range of potentially life-compromising behaviors, be moderately but not highly correlated with measures of depression and hopelessness, and predict a suicide attempt within the limits imposed by the low base rate of such behaviors. Finally such an instrument should be relatively short so that is can be administered quickly and easily in clinical and non-clinical (e.g., school) settings.

A second goal of the present study was to test a theoretical construct that we initially labeled suicide-proneness, which was assumed to be to reflect a person's propensity at a point in time to engage in suicidal behavior. In keeping with others (e.g., Farberow, 1992; Menninger, 1938; Pfeffer, 1985; Smith & Crawford, 1986), our definition of suicidal behavior included subtle/non-obvious self-destructive behaviors (e.g., violence-provoking behaviors), risk-taking behaviors, as well as behaviors that are obviously and overtly suicidal (e.g., pointing a gun at oneself). The domain of suicidal behavior was expanded further by the addition of a positive pole characterized by life-extending behaviors. On the basis of our literature review and theoretical

considerations, we generated operational definitions for four content categories which were assumed to be sufficient to encompass the domain of suicidal behavior: death/life-related (DR), health/illness-related (HR), injury-related (IR), and self-related (SR). For each content category both a negative (life-compromising) and a positive (life-enhancing) pole were identified. Following traditional distinctions in psychology (e.g., Bandura, 1977; Smith & Crawford, 1986; Staats & Staats, 1963), we also distinguished between actions, thoughts, and feelings.

Test Construction Framework

The LAS was constructed using a sequential multi-stage process. As has been recommended by Millon (1983), Jackson (1970), and Tellegen (Zevon & Tellegen, 1982) among others, we maintained a close relationship between theory, test development, reliability, validity, and eventual clinical utilization. As already indicated, we began by delineating the broad construct of suicide-proneness as precisely as possible. On theoretical grounds, we hypothesized the presence of a general bipolar factor that would appear as a first principal component with significant loadings on all of the items. We also theorized that suicide-proneness would be normally distributed in the general population with only a small percentage of people being identified either as extremely high or extremely low on the dimension. Items were generated to fit into the four content categories and we expected

the latter to emerge as relatively orthogonal factors. Similarly, we expected the three behavior types (e.g., actions, thoughts, and feelings) to define separate factors.

Method

Subjects

Sample 1. In 1989, six initial versions of the Life Attitudes Schedule (LAS) were administered on two separate occasions to 757 predominantly Caucasian students who were enrolled at a large, urban high school in northern California. Slightly more than half of the subjects (58%) were female. Subjects ranged in age from 13 to 18 years with the mean age of 16.0 years. There were approximately equal numbers of freshman, sophomores, juniors, and seniors.

Sample 2. The second sample consisted of 104 college undergraduates who voluntarily participated in 1989 to partially fulfill a research credit requirement for their introductory psychology courses. Seventy-two percent of the subjects were female. Subjects ranged in age from 18-42 years old with a mean age of 20.8 years. Most (78%) were Caucasian, 14% were Asian or Pacific Islanders, 2% were African American, 2% were Hispanic, and 4% were other.

Sample 3. In 1990, 32 adolescents were recruited from two ongoing research studies which are described in greater detail elsewhere (Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Lewinsohn, Clarke, Rohde, Hops, & Seeley, in press). All

subjects were Caucasian. Half of the subjects (n = 16) were participants in a treatment outcome study of adolescent depression (mean age = 15.3; 73% female) who met DSM-III-R criteria for major depression (n = 11) or dysthymia (n = 5). A matched (age and gender) control group (n = 16) was recruited from an ongoing community based epidemiological study of psychopathology. In addition to matching on age and gender, the control subjects had no past or current psychiatric diagnoses. All subjects were paid for their participation.

Sample 4. In 1993, another 646 high school students from the same high school utilized in Sample 1 participated to determine the psychometric properties of three new versions of the LAS. Approximately half of the subjects were female (48%). The majority (80%) were Caucasian. There were approximately equal numbers of freshmen (32%), sophomores (28%), juniors (20%), and seniors (20%). After one month, 412 (64%) of the participants repeated the procedure.

Measures

Prototype for the Life Attitudes Schedule. As illustrated in Table 1, half the items were designed to assess life-compromising (negative) behaviors while the other half assessed life-enhancing (positive) behaviors. Four content category subscales were incorporated into the LAS: death-related (DR), health-related (HR), injury-related (IR), and self-related (SR). The DR items included traditional suicide and death-related items

(e.g. "I wrote a suicide note"), as well as items regarding life and longevity items (e.g., "I am hopeful that I will live to a ripe old age."). Illness, lack of self-care, health and wellness items comprised the HR category (e.g., "I try to eat fodds that are good for me"). The IR category included injury, risk-taking, and safety related items (e.g., "I jumped on or off a moving vehicle."). The SR category included items that either enhanced or compromised the person's self-worth as well as items that described accomplishments or self-image (e.g., "Most of the time, I feel confident and assured"). The LAS included an equal number of items representing actions, thoughts, and feelings. Thus, as can be seen in Table 1, the items on the LAS can be categorized into a 4 content area by 3 behavior type by 2 valence matrix. Four items were chosen for each cell for a total of 96 items per form.

Insert Table 1 about here

LAS Item Selection and Inclusion. Two of the authors (PML and JLR) compiled items from the suicide assessment devices reviewed in Lewinsohn et al.(1989). Additional items, both positive and negative, were obtained from daily self-monitoring records completed by a small group of high school volunteers. Over 600 items were derived from these two sources. The specific definitions of the four content domains and the three behavior

categories which had been created (available upon request) were used by the first two authors to independently categorize all items as DR, HR, IR, or SR, and as actions, thoughts, or feelings. Item rating disagreements were discussed and often led to the refinement of the operational definitions or to item revision. The initial distribution of items across the content categories and the behavior types was unequal (e.g., most of the items [60%] were categorized as DR, whereas only 2% fit into the IR domain; the majority of items were thoughts). Therefore, two authors (PML and JLR) wrote additional items for those cells of the theoretical matrix that had a small initial number of items. Items were retained for the LAS forms if they were reliably classified by both authors; appeared to be clear, unambiguous, and free of gender, race, and obvious social desirability biases; were likely to be endorsed by a substantial but not universal proportion of adolescents; and did not appear to represent symptoms or signs of depression or hopelessness.

The LAS is scored so that higher scores indicate higher levels of suicidal behavior. The 48 positive items are reversed and summed with the 48 negative items for an LAS total score value that can range from 0 (i.e., no endorsement of any negative item and endorsement of every positive item) to 96 (i.e., endorsement of every negative item and no endorsement of any positive item).

Creation of six initial LAS forms. A sufficient number of

items were available to create three perfectly balanced 96-item versions of the LAS. Three additional LAS forms, for which four items were not available for every cell in the matrix, were also created in order to provide pilot data for all initial items. These six initial LAS forms (Forms A - F) were administered to Sample 1. Because of the smaller sample size that was available in the college sample, only the three initial balanced LAS forms were administered to Sample 2 participants.

Creation of the three new LAS forms. Psychometric data derived from Samples 1 and 2 were used to select items for what was hoped would be three internally consistent and reliable alternate forms of the LAS; psychometric properties of the three new forms were evaluated in Samples 3 and 4. Items were chosen for the new versions of the LAS based on low correlations with social desirability, gender, age, depression and hopelessness and high correlations with the LAS. To quantify an item's association with social desirability in relation its association with the LAS total score, the Differential Reliability Index was computed (Jackson, 1970). This index estimates the amount of content variance that remains after removing variance associated with social desirability bias. Another criterion for retention of items was low correlations with measures of depression and hopelessness in relation to associations with LAS total score. In addition, the item had to be endorsed by at least 5% but not more than 95% of the sample.

The Center for Epidemiologic Studies-Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item self-report measure of depressive symptomatology. Subjects rate the frequency with which they have experienced any symptoms of depression during the past week. It is short, easy to read, and has been successfully used to assess depression in adolescent populations (Roberts, Andrews, Lewinsohn, & Hops, 1990). The CES-D correlates substantially (.70 to .80) with other self-report depression instruments and has been shown to have reasonable psychometric properties (Radloff, 1977).

Beck Hopelessness Scale (Beck, Weissman, Lester, & Trexler, 1974). The Hopelessness Scale is a 20-item true-false inventory designed to measure lack of hope about the future. Beck et al. (1974) report internal consistency ratings of .93 for this measure. Although this scale correlates highly with measures of depression, it has been found to be a better predictor of future suicide in a sample of hospitalized adult patients than measures of depression (Beck, Steer, Kovacs, & Garrison, 1985).

The Crowne-Marlowe Social Desirability Scale (Crowne & Marlowe, 1960). Subjects were given an abbreviated version of this scale which measures the degree to which subjects are responding in a socially desirable way. The 6-item true-false short form has been shown to have good reliability and validity properties in an adolescent population (Andrews, Lewinsohn, Hops, & Roberts, 1993).

The Infrequency Scale of the Personality Research Form (Jackson, 1976). This scale consists of items which the vast majority of the population have been found to answer in a certain direction (e.g., "There have been times when I have dialed a telephone number only to find that the line was busy"). Five items from this scale were included in the forms administered to Samples 1 and 4 to identify subjects who were not legitimately reading and responding to the test questions. Subjects who endorsed three or more items in the infrequent direction (2.0% in Sample 1 and 1.9% in Sample 4) were excluded from all analyses.

The Life Attitudes Interview Schedule (LAIS) The LAIS (Lewinsohn, Langhinrichsen-Rohling, & Langford, 1989) is a semi-structured interview designed to parallel the format of the LAS but to focus specifically on suicidal behavior. The LAIS probes for suicidal behaviors during two time periods: current (past seven days) and worst past. A third section asked subjects to anticipate their potential for future suicidal behavior. Subjects were also asked to identify any previous suicidal attempts or parasuicidal behavior (i.e., intentionally injuring or harming oneself). Subjects were asked to describe up to five previous attempts in considerable detail.

Two of the authors (PML and PR) rated the LAIS items for content and behavior category. Classification discrepancies, which were few, were discussed and a consensus agreement was obtained. In this manner, a total of 85 items from the LAIS were

rated and categorized.

LAIS scores were computed combining items assessing the current and worst past periods. Thirty-two items were rated as DR (alpha = .84); 9 items were HR (alpha = .48); 24 items were IR (alpha = .81); and 20 items were SR (alpha = .80). Regarding the behavior categories, 39 items were rated as actions, 21 items were thoughts, and 25 items were feelings. Coefficient alphas for the three behavior categories were .80, .79, and .86, respectively.

Procedures

Sample 1. Participants entered the project through a passive parental and active adolescent consent procedure. Approximately 80% percent of the potential subjects were eligible to participate after the consent form was administered. For all participants, the assessment package was filled out under the supervision of a teacher. Research assistants present in the classroom followed a prepared protocol to insure uniform data collection. Each assessment package consisted of one of the six initial LAS forms, the CES-D, the Beck Hopelessness Inventory, the Marlowe-Crowne Social Desirability Scale, and the Infrequency Scale of the Personality Research Form. Students were given 50 minutes to fill out the assessment package. The subjects were then re-administered an identical assessment package one month later. One dollar was donated to the high school for every student that completed both phases of the project.

Thirty-four of the students who completed both LAS administrations were selected to participate in the LAIS interview on the basis of their scores on the 4-item Suicidal Ideation Scale (Andrews et al., 1993); half were high scores and half were low scorers. The mean age was 16.1 (range = 14 to 18); 71% were female. LAIS interviews were conducted by graduate students in psychology who participated in a year-long practicum on suicide assessment and intervention.

Sample 2. The procedure for college student subjects differed only slightly from what was described above. First, subjects actively volunteered to participate in order to fulfill an introductory psychology research requirement. Second, the second administration of the assessment package occurred two weeks later, rather than one month. Third, at the conclusion of the second phase, all subjects were asked if they wanted to participate in a clinical interview on the same topics (i.e., the LAIS). Resources were available to interview 50 subjects (mean age = 21.1, range 18 - 37; 72% female). Twenty-five of the subjects were from the top LAS score quartile; twenty-five of the subjects were from the bottom quartile. Interviews were conducted by trained undergraduate and graduate psychology students who had participated in a year-long clinical practica on suicidal behavior.

Sample 3. The depressed adolescents and their matched never-mentally ill controls were a convenience sample recruited

through their participation in other on-going research at the Oregon Research Institute. They were offered money for their participation. All data was collected on one occasion. Subjects filled out one version of the LAS and participated in the LAIS interview, which was conducted by trained diagnostic interviewers whose qualifications have been described elsewhere (Lewinsohn et al., 1993).

Sample 4. The procedure for LAS administration in Sample was very similar to that used in Sample 1. The primary difference was that the majority of Sample 4 subjects who repeated the LAS (n = 238) received a different version of the LAS, to provide data regarding alternate form comparability; all combinations of the repeated forms were administered (i.e., AB, AC, BA, BC, BA, BC). In addition, 174 subjects completed the same LAS form at T2, providing test-retest reliability; the remaining 226 subjects only completed the first LAS administration. None of the Sample 4 participants were administered the LAIS.

Results

The results focus primarily on the three final alternate LAS forms. Consequently, unless otherwise noted, data were obtained from the Sample 4 high school students. The main exceptions are the LAS construct and criterion validity results using the LAIS, which was administered to a subset of participants from Samples 1, 2, and 3.

Are the Three Final Alternate LAS Forms Comparable?

Form Psychometric Properties. Our intention was to create three interchangeable versions of the LAS. Unfortunately, as is shown in Table 2, total LAS score means for the three forms differed significantly from one another, F (2, 618) = 10.36, p <.001. Specifically, subjects reported fewer life-compromising behaviors and more life-enhancing behaviors on Form 2 than on Forms 1 and 3, which did not differ from each other. Differences between forms on several of the other scale means were also significant. However, measures of internal consistency (i.e., coefficient alpha), and pearson and partial correlations (controlling for CES-D, BHI, and social desirability) with LAS total score for the LAS scales were all very strong and remarkably consistent across the three forms.

Insert Table 2 about here

Given the differences in mean scores, profiles have been created and are available upon request for converting the obtained LAS subscale scores (total score and the 12 orthogonal content x behavior scales) for each of the three forms to standard scores. These profiles have been developed for the total sample and for females and males separately.

As intended, the LAS Total scores had an approximately normal distribution for each of the three forms. Although the

tests of normality for all three forms were statistically significant (Lilliefors test [df = 204, 230, 187] = .096, .134, and .108, respectively, all $p < .001$), this is almost guaranteed in large samples. Visual inspection of the total LAS score frequency distributions for the three forms indicated close approximation the a normal distribution, with a slight positive skew. As another indication of relative normality, the normal probability plots (in which each of the observed values is paired with its expected value from the normal distribution) approximated a straight line. As an illustration of the distributions, mean and median LAS scores for the three forms (which would be identical given a perfectly normal distribution) were: (1) 29.6 and 27.0, (2) 24.0 and 20.0, and (3) 29.3 and 28.0, respectively.

Psychometric properties for the 24 4-item LAS subscales (i.e., content x behavior x valence cells) were computed and are available upon request. Not unexpectedly given their small item number, psychometric properties (e.g., coefficient alpha, test-retest reliability) for the 4-item subscales were less robust and more variable across forms.

Item Psychometric Properties. Psychometric properties (e.g., frequency of endorsement, test-retest reliability, item correlations with LAS total) for all 288 items (96 items x 3 LAS forms) were computed and are available from the authors. Consistent with expectation, 93.1% of the items ($n = 268$)

correlated with the LAS total score at $p < .01$. Approximately 18% of the items had significant gender differences in level of endorsement (girls had greater endorsement on approximately half of the items). Item correlations with the LAS total score were relatively strong (mean $r = .37$, range = .01 to .61), and remained robust even after controlling for social desirability (Differential Reliability Index mean = .33, range = .00 to .60). As intended, less substantial correlations were obtained between LAS items and depression (mean r with CES-D = .23, range = .00 to .57) and hopelessness scores (mean r with BHI = .26, range = .00 to .65).

In conclusion, the psychometric properties of the three LAS forms, with the exception of mean endorsement levels, were quite comparable. The issue of LAS form comparability is addressed below in greater detail when we evaluate the theoretical model underlying the LAS instrument.

Is the LAS a reliable instrument?

Test-retest correlations over a one-month period are shown in the last column of Table 2. The test-retest correlations for LAS total score averaged .83 for the three forms. Test-retest correlations for the three behavior types were also quite substantial, averaging .77 (with a low of .59 for actions on Form 2 to a high of .90 for thoughts on Form 1). Test-retest correlations obtained for the four content categories were also satisfactory (mean $r = .77$, range = .66 to .88). Average test-

retest correlations for the scales on Forms 1 and 3 (both .82) were somewhat higher than the average test-retest correlation for Form 2 scales (i.e., .70), although all values were good.

Is the LAS a valid instrument?

Three approaches were used to evaluate the validity of the LAS. The first method involved correlational analyses across the three LAS forms; the second consisted of construct and criterion validity analyses using LAIS data; and the third consisted structural equation modeling to test several theoretical models underlying the LAS.

Correlational analyses

Construct validity was first assessed by correlating identical scales across each of the LAS forms (e.g., DR scale on Form 1 should correlate highly with DR scale on Form 2). These correlations are shown in Table 3. As can be seen, the correlations for LAS total scores across form tended to substantiate the validity of the construct underlying the LAS (average r across form = .75). They were similar in magnitude and only slightly smaller than the correlations obtained from the test-retest reliabilities (average test-retest r = .83). Correlations across forms for the three behavior types were all very similar and ranged from r = .61 to .74. There was, however, more variability in the associations across forms for the four content categories. The lowest correlation obtained was .28 between SR scale in Form 1 and Form 3. The highest correlation

was .81 for the SR scale between Form 2 and Form 3.

Insert Table 3 about here

Next, discriminant validity was evaluated in two ways. First, scales within LAS forms were correlated with one another and compared with results in Table 3. We expected the associations of same scales across forms to be stronger than associations of different scales within form (e.g., DR scales in Form 1 and Form 2 should have a higher correlation than DR and SR scales in Form 1). Within-form correlational results are shown in Table 4. Contrary to expectation, the correlations between the different behavior types in the same form were, on average, higher than the associations of the same behavior types across forms (average within-form $\underline{r}$ for different behavior types = .80 vs. across-form $\underline{r}$ for identical behavior types = .66). This may have been due to the high internal consistency of the entire LAS in general, and to the fact that the same subjects were completing the LAS for the within-form calculations. For the content categories, the across-forms correlations for same categories (average $\underline{r}$ = .59) were slightly higher than the within-form $\underline{r}$s for different categories (average $\underline{r}$ = .55).

Insert Table 4 about here

In addition, we considered the associations between LAS scale scores and measures of depression, hopelessness, and social desirability. We expected moderate associations among these variables only. Average LAS scale correlations with CES-D were .43, .59, and .59 across the three forms. Average correlations with BHI were .57, .65, and .55, respectively, and average correlations with social desirability were .39, .38, and .38. In comparison, average scale correlations with LAS total were .87, .90, and .87.

Validity Analyses with the LAIS

Given that (a) relatively few subjects had completed the LAIS, (b) the various LAS forms appeared to be similar in structure, and (c) the LAS-LAIS correlational matrices for the three samples were quite comparable upon examination, data from all subjects completing the LAIS interview (n = 116) were combined for the following analyses.

Construct Validity. As a measure of LAS construct validity, the correlations of the LAS and LAIS scales were computed and are presented in Table 5. LAS and LAIS scale correlations, which appear in the matrix diagonal, were all highly significant (average correlation across the two assessment methods was .59), ranging from a low of .36 (HR) to a high of .71 (LAS total with LAIS total). Examining the entire matrix, correlations for the various scales were in general highest for either the same scale on the other instrument (e.g., LAS thoughts with LAIS thoughts)

or with total scores on the LAS and LAIS.

Insert Table 5 about here

Criterion Validity. Next, we conducted a series of correlational analyses examining the relation of LAS scale scores with three dichotomous measures as identified by the LAIS interview: (a) the presence (n = 21) vs. absence (n = 95) of accidental injuries during subjects' worst past period; (b) the presence (n = 17) vs. absence (n = 99) of intentional injuries during worst past period (i.e., parasuicide attempts), and (c) the lifetime history of suicide attempt (n = 17) vs. no reported suicide attempt (n = 99). The correlations of LAS scale scores with these three criterion measures are shown in Table 6. With only two exceptions, the LAS scales were significantly ($p < .05$) associated with the three criteria (average correlation with accidental injuries was .25; average LAS scale correlation with intentional injuries was .25; average correlation with suicide attempt was .40). LAS correlations were strongest in association with lifetime history of suicide attempt, where they ranged from r = .30 (HR) to r = .56 (total feelings).

Insert Table 6 about here

Testing the LAS theoretical model

As our final evaluation of LAS construct validity, we conducted a series of structural equation models using T1 data from Sample 4. We began by testing the most basic assumption of the theory which postulates that the positive and negative items would define a single bipolar dimension.

Confirmatory factor analysis (CFA) was used to test the fit of the model specifying positive and negative "poles" as measured by (a) the three behavior categories, and (b) the four content categories. A model was specified such that the positive scales of actions, thoughts, and feelings were constrained to load only on a positive latent construct whereas the negative scales were constrained to load on the negative latent construct; the positive and negative constructs were allowed to correlate with each other. The initial fit of the model was good: Comparative Fit Index (CFI) = .986, Bentler-Bonett Normed Fit Index (BBNFI) = .974, chi-square (8, N = 584) = 36,59, p < .001. After modifying the model to allow for covariation between two pairs of error terms, an excellent fit was obtained: CFI = .999, BBNFI = .999, chi-square [6, N = 584] = 7.15, p = .307 (a non-significant chi-square value indicates that the actual data do not significantly differ from the proposed model). All six of the scales had significant and substantial (> .70) loadings on their respective latent constructs, and the positive and negative constructs were highly correlated (r = -.88).

Similarly, the model that specified the positive and

negative constructs from the four positive and four negative content category scales had a very good fit (after modification to allow for covariation among 10 pairs of error terms): CFI = .996, BBNFI = .989, chi-square (10, N = 584) = 18.08, p = .054. All eight of the scales had significant and substantial (> .49) loadings on their respective constructs, and the positive and negative constructs were highly correlated in the negative direction (r = -.89). The models supported the hypotheses that negative and positive scales formed a single bipolar continuum.

Multi-sample confirmatory models were also employed to test the equality of the factor structure of the positive and negative behavior scales across gender, across the three LAS forms, and across social desirability groups. On the basis of scores on the social desirability scale, subjects were dichotomized at the median to form low and high social desirability groups. The factor loadings and factor correlations were found to be invariant across gender groups. Regarding LAS form analyses, two significant, albeit minor, form differences were found: (a) Form 2 had a higher correlation between the positive and negative factors (r = -.94) than Form 1 (r = -.84), and (b) thoughts had a higher loading on the positive factor for Form 3 (.90) than for Form 1 (.83). The only significant difference between models for the two social desirability groups was a higher loading for the thoughts scale on the positive factor for the low social desirability group (.85) than for the high social desirability

group (.81). Given that all of the above mentioned differences were relatively small and significant only because of the large sample size, it seemed reasonable to conclude that for most intents and purposes, the models did not differ on the basis of gender, LAS form, or social desirability.

In order to further test the hypothesized theoretical model, a CFA was specified following a multitrait-multimethod paradigm. That is, each of the 12 scales (e.g., death-related actions, self-related feelings) were constrained to load on both of their respective content category and behavior type constructs (see Figure 1). Given that the results reported earlier provided support for a single bipolar dimension versus separate positive and negative factors, all positive and negative subscales were combined. The fit of the confirmatory model was reasonably good: CFI = .979, BBNFI = .959, chi-square (34, N = 584) = 101.36, p < .001. All of the LAS scales had significant loadings on both their respective behavior type and content category constructs with the exception of death-related action on the action behavior construct. The most parsimonious explanation for this finding is the low frequency of many of the behaviors assessed in the death-related action category (e.g., I wrote a suicide note, I pointed a gun at myself). The three behavior type latent constructs were highly inter-correlated as were the four content category constructs, although to a somewhat lessor degree. In addition, the model had a good fit for male subjects (CFI = .987, BBNFI =

.975, chi-square [34, N = 302] = 55.62, p = .011) and for female subjects (CFI = .983, BBNFI = .966, chi-square [34, N = 282] = 60.37, p = .004). Also, the model was found to be robust across the three forms: Form 1 CFI = .969, BBNFI = .940, chi-square (34, N = 198) = 66.87, p < .001; Form 2 CFI = .992, BBNFI = .985, chi-square 934, N = 206) = 44.21, p = .113; and Form 3 CFI = 1.00, BBNFI = 1.00, chi-square (34, N = 180) = 34.12, p = .462.

Insert Figure 1 about here

The three behavior types and four content categories were further examined to test a hierarchical model in which the behavior and content category constructs loaded on a single second-order factor representing a more general dimension of suicide-proneness. The second-order CFA model was tested separately for both the behavior type and content category constructs. An acceptable fit of the second-order model was found for the three behavior types (CFI = .959, BBNFI = .927, chi-square (37, N = 584) = 167.19, p < .001) and for the four content categories (CFI = .981, BBNFI = .968, chi-square (39, N = 584) = 100.21, p < .001). All of the first-order and second-order factor loadings were significant at p < .001. Factor loadings for the actions, thoughts, and feelings constructs on the higher-order suicide-proneness construct were .93, .97, and .97, respectively. Factor loadings for the content categories on

the higher-order suicide-proneness construct were .92 (DR), .86 (HR), .70 (IR), and .83 (SR). The results of these analyses, along with the high intercorrelations from the multitrait-multimethod CFA model, provide support for an overall, general dimension of suicide-proneness.

Discussion

This paper described the creation of three alternate forms of a new scale to assess suicidal and life-endangering behaviors in adolescents. The LAS is unique because it is derived from a broad theoretical perspective. Essentially, in keeping with the writings of Menninger (1938) and others (e.g., Kulbok, Earls, & Montgomery, 1988), we hypothesized that there is a single domain of behaviors to which all life-enhancing and life-compromising behaviors belong. These behaviors were expected to fall along a continuum from positive to negative and to encompass actions, thoughts, and feelings. Furthermore, we expected there to be four relatively distinct content domains which we labeled death-related, health-related, injury-related, and self-related. Unlike most of the available measures in this area, items used in the LAS were specifically selected and constructed to share only moderate variance with related constructs of depression, hopelessness, and social desirability. Overall, our goal was to provide information on the degree to which data collected using the LAS supported the theoretical model underlying its development, as well as describing how reliable and valid this

measurement device appears to be.

Psychometric properties of the LAS. Overall, the data suggest that the LAS is a psychometrically sound instrument. One month test-retest correlations for the main scales were quite high for all three forms indicating reasonable reliability over time. Measures of internal consistency (i.e., coefficient alphas) obtained in the current study were also substantial, supporting the underlying theory of a latent construct of behaviors related to suicide proneness. Moreover, our results suggest that this instrument has substantial convergent and discriminant validity. Specifically, the scale correlations with depression and hopelessness, although significant, were substantially lower in magnitude than comparable correlations with LAS total. Similarly, while statistically significant, correlations with social desirability were low in magnitude. It is very important to note that in spite of scale correlations with depression, hopelessness, and social desirability, the partial correlations with LAS total score after controlling for these constructs remained very robust.

In spite of our efforts to make the three forms as comparable as possible, small but significant mean differences in level of item endorsement were obtained between the three forms. Although this may suggest that the three versions differ in the relative sensitivity with which they assess suicide-proneness, in most respects, the dimensional structure was quite comparable

across forms. We interpret these data to suggest that the forms are interchangeable if standardized scores are used.

Researchers and clinicians interested in using the LAS may want to choose specific items from the large set of items tested in this study. Investigators should have little trouble selecting a subset with known psychometric characteristics. This may be particularly important for those who need a shorter version of this scale. A comprehensive list of items and there psychometric properties is available from the authors upon request.

Testing the theoretical model. The high degree of association that was obtained between latent constructs assessing the positive and negative poles suggested that, as predicted, this domain can be conceptualized as a bipolar continuum of positive and negative behaviors. Clinically, the findings suggest that it may be important to identify individuals who are not engaging in positive behaviors even if they are not currently overtly engaging in negative behaviors. The results suggest that "low-level-of-positive behaviors" individuals are at elevated risk for life-compromising behavior and that treatment and prevention efforts should consist of a two-pronged approach, promoting life-enhancing behaviors, as well as reducing life-shortening behaviors.

Contrary to our initial expectation, structural equation analyses failed to substantiate distinct action, thought and

feeling constructs; correlations of the three behavior type latent constructs were substantial and all three loaded about equally on the higher-order construct of suicide-proneness. This may be a reflection of the magnitude of the relationships between these behaviors, although the possibility that it is an artifact of the method of measurement cannot be ruled out. Self-report devices may not be the most appropriate method for determining the relations between actions, feelings, and thoughts because the self-report approach asks people to report their thoughts and recollections (i.e., thoughts) about actions and feelings. A methodology that includes observational data may be necessary to further clarify this issue. Until these uncertainties are resolved, it may be useful to maintain the differentiation among the three behavior types.

Since clinicians are most critically concerned with the suicidal actions of their patients (as opposed to suicidal thoughts or feelings), one research direction for exploration is whether items assessing actions predict future suicidal actions better than items assessing thoughts and feelings. Examination of the relevant LAS scale correlations with past suicidal behavior in the present study did not reveal a difference in the magnitude of associations for LAS actions, thoughts, and feelings but research utilizing a prospective design is needed to address this issue.

Our a priori definition of life-enhancing and life-

compromising behaviors recognized four content categories. Compared to the three behavior types, the latent constructs representing the four content categories were less highly interrelated, and none of their path coefficients were as high as those for the three behavior types. The death-related construct was most, and the injury-related construct was least, strongly related to the other content categories. Paralleling this, the DR construct loaded most highly on the higher-order suicide-proneness construct (.92) while the IR construct was the lowest (.70).

In conclusion, we interpret the results as providing support for the theoretical model that provided the framework for this research, as well as providing relatively specific information about the four content categories.

The present study complements the work of Jessor and colleagues, who showed a clustering of problematic behaviors (e.g., Donovan & Jessor, 1985; Jessor & Jessor, 1977), as well as the work of Farberow and colleagues (e.g., Farberow, Stein, Darbonne, & Hirsch, 1970; Nelson & Farberow, in press; Farberow & Williams, 1980) who focused on the subtle self-destructive behaviors done by some chronically ill adult and elderly patients. Also compatible with the broad conceptualization of suicidal behavior used in the present study, low social support and feelings of worthlessness have been found to be associated with both higher rates of health-compromising behaviors (e.g.,

driving while intoxicated, sunbathing) and lower rates of health-enhancing behaviors (e.g., toothbrushing, exercise) (Scott & Cabral, 1988). The broad focus taken in our definition of suicide proneness, specifically the inclusion of HR and IR domains, is also consistent with a move toward a more comprehensive view of health (e.g., Millstein, Petersen, & Nightingale, 1993).

Future research. A number of future research directions with the LAS can be suggested. The first priority is to undertake a prospective study to determine the extent to which elevated scores on the LAS predict future life-compromising and life-enhancing behavior. A second line of research might examine whether a high rate of engagement of life-extending behaviors acts as a buffer for the negative effects of suicide risk factors such as physical illness that resulting in functional impairment or the suicidal death of a close friend or family member (Lewinsohn, Rohde, & Seeley, 1994). This would parallel the findings by Cohen and Hoberman (Cohen & Hoberman, 1983) that the perceived availability of social support and the number of positive events buffered the effects of negative life stress on depression. Third, it would be worthwhile to determine how the LAS is affected by other variables known to be risk factors for suicidal behavior such as interpersonal difficulties, history of sexual and physical abuse, academic difficulties, and chronic stressors. Another avenue of research might evaluate the LAS in

the context of other personality factors, such as the "big five." Fifth, although we choose to examine the psychometric properties of this instrument with adolescents because they are an age group known to be vulnerable to a variety of risky, suicidal, and life-shortening behaviors, the LAS can be easily adapted for use with other age groups, including older white men, who are as a group at the highest risk for suicide completion (National Center for Health Statistics, 1991). Further research will be needed to see how the LAS performs across the age span and if the LAS is sensitive to potential age-related changes in life-enhancing and life-shortening behaviors (e.g., decreases in risk-taking behaviors may occur with increasing age).

We believe that we have established the reliability and validity of three alternate forms of a new instrument and provided support for an underlying construct that may be useful in identifying individuals whose rate of engagement in life-compromising and life-enhancing behaviors is problematic. It is our hope that the LAS will perform well both as a screening device to identify suicide-prone adolescents and adults and as a way to evaluate the effectiveness of interventions designed to reduce life-shortening behaviors and increase life-enhancing behaviors.

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All materials described in this paper are available from the authors upon request. Correspondence concerning this article should be addressed to Peter M. Lewinsohn, Oregon Research Institute, 1715 Franklin Boulevard, Eugene, Oregon 97403-1983.

Table 1

The Theoretical Matrix Used to Construct LAS and Sample Items

Behavior Type	Content Category			
	Death-Related (DR)	Health-Related (HR)	Injury Related (IR)	Self-Related (SR)
Actions (A)	+ -	+ -	+ -	+ -
Thoughts (T)	+ -	+ -	+ -	+ -
Feelings (F)	+ -	+ -	+ -	+ -

DR A +	I would never play Russian Roulette.
DR A -	I wrote a suicide note.
HR A +	I maintain a health balance between work and play.
HR A -	I often skip meals.
IR A +	I jumped on or off a moving vehicle.
IR A -	I wear reflective clothing when riding a bike at night.
SR A +	I rarely do things that violate my standards.
SR A -	I spend a lot of time feeling sorry for myself.

DR T +	I expect to have a long and interesting life.
DR T -	The idea of suicide has crossed my mind.
HR T +	Getting enough sleep at night is important to me.
HR T -	Seeing a dentist for regular checkups is not important.
IR T +	I am the type of person that thinks about how to protect myself.
IR T -	I often am not as cautious as I should be.
SR T +	I believe that I am a good person.
SR T -	I am a sloppy dresser.
DR F +	I am happy and excited about the future.
DR F -	I enjoy thinking about death.
HR F +	I enjoy eating "right."
HR F -	I don't really care much about what I eat.
IR F +	When working with sharp tools, I worry about hurting myself.
IR F -	I am not afraid of personal injury.
SR F +	I feel good because my family cares about me.
SR F -	I have experienced an overwhelming feeling of anguish.

Table 2

Psychometric Properties of LAS Scales in the Three Forms

Variable / Form	Mean (SD)	Alpha	r with LAS Total: pearson	r with LAS Total: partial	T1-T2 r
LAS Total					
1	29.58 (14.73)$_a$	.92	1.00		.85
2	23.96 (15.16)$_b$	.94	1.00		.75
3	29.29 (13.37)$_a$	.92	1.00		.88
Total Actions					
1	11.12 (5.43)$_a$	.82	.91	.87	.80
2	8.35 (4.97)$_b$	.81	.91	.89	.59
3	9.81 (4.27)$_c$	.71	.92	.85	.88
Total Thoughts					
1	8.64 (4.93)$_a$	.82	.92	.86	.90
2	6.68 (5.34)$_b$	.87	.93	.83	.69
3	8.99 (5.11)$_a$	.83	.94	.88	.84
Total Feelings					
1	9.52 (5.35)$_{ab}$	.81	.93	.86	.71
2	8.64 (5.66)$_a$	.88	.94	.85	.72
3	10.40 (5.06)$_b$	.81	.93	.87	.81
Total Death-Related					
1	4.72 (3.84)$_a$	.77	.82	.65	.82
2	4.83 (3.93)$_a$	.85	.88	.73	.76

3	6.15 $(3.88)_b$	.78	.83	.63	.66
Total Health-Related					
1	7.63 $(4.34)_a$	.77	.83	.76	.80
2	6.25 $(3.95)_b$	.77	.85	.74	.68
3	9.55 $(3.82)_c$	.71	.80	.74	.82
Total Injury-Related					
1	11.89 $(5.27)_a$	.85	.78	.82	.88
2	7.69 $(5.17)_b$	.86	.84	.81	.68
3	8.54 $(4.86)_b$	.82	.74	.80	.87
Total Self-Related					
1	5.07 $(4.38)_a$	.87	.79	.56	.79
2	5.10 $(4.68)_a$	.87	.81	.55	.72
3	4.93 $(4.61)_a$	.87	.76	.45	.78

Note. Partial correlation with LAS Total controls for CES-D, BHI, and social desirability items. Correlations greater than .19 in magnitude are significant at $p < .01$.

Means with different subscripts differed significantly in Scheffe post-hoc comparisons.

Table 3

LAS Scale Correlations Across Forms

Scale forms	Correlation across the two forms
LAS total	
1-2	.72
1-3	.74
2-3	.80
Actions	
1-2	.64
1-3	.63
2-3	.68
Thoughts	
1-2	.61
1-3	.64
2-3	.74
Feelings	
1-2	.67
1-3	.60
2-3	.72
Death-Related	
1-2	.56
1-3	.58

2-3	.68
Health-Related	
1-2	.63
1-3	.45
2-3	.49
Injury-Related	
1-2	.52
1-3	.49
2-3	.77
Self-Related	
1-2	.78
1-3	.28
2-3	.81

Note. All correlations were significant at $p < .001$.

Table 4

Correlations Between Different Behavior Types and Content Categories within the Same Form

Behavior Type		
Form		
Thoughts	Actions	Thoughts
1	.74	
2	.77	
3	.81	
Feelings		
1	.81	.81
2	.82	.82
3	.78	.82

Content Category			
Form	DR	HR	IR
HR			
1		.54	
2		.65	
3		.51	
IR			
1		.48	.59
2		.67	.66
3		.43	.59

SR			
1	.69	.54	.38
2	.70	.59	.46
3	.70	.46	.24

Note. All correlations were significant at $p < .01$.

Table 5

Correlation of LAS and LAIS Scales

		LAS Scales							
		Tot	Act	Tht	Feel	DR	HR	IR	SR
	Tot	.71	.59	.70	.70	.63	.52	.56	.66
	Act	.66	.58	.60	.64	.54	.53	.59	.52
	Tht	.68	.56	.69	.67	.63	.48	.54	.64
LAIS	Feel	.62	.49	.63	.62	.57	.43	.45	.62
Scales	DR	.64	.52	.65	.63	.59	.43	.53	.60
	HR	.46	.40	.42	.46	.45	.36	.33	.41
	IR	.59	.51	.55	.60	.47	.52	.55	.47
	SR	.62	.51	.63	.62	.58	.44	.44	.63

Note. LAS scales are shown in the columns and LAIS scales are shown in rows. Tot = total score; Act = actions; Tht = thoughts; Feel = feelings; DR = death-related; HR = health-related; IR = injury-related; SR = self-related. Significance of all correlations greater than $p < .001$.

Table 6

Correlation of LAS Scales with Suicidal Behavior (as per LAIS)

Suicidal Behavior	Tot	Act	Tht	Feel	DR	HR	IR	SR
accidentally hurt or injured self during worst past period	.27**	.32***	.18	.27	.26**	.26**	.22*	.21*
intentionally hurt or injured self during worst past period	.29**	.23*	.25**	.30**	.24**	.21*	.23*	.25*
lifetime history of suicide attempt	.45***	.38***	.43***	.46***	.38***	.30***	.43***	.40***

Note. *p < .05; **p< .01; ***p < .001. Tot = LAS total score; Act = LAS actions; Tht = LAS thoughts; Feel = LAS feelings; DR = LAS death-related; HR = LAS health-related; IR = LAS injury-related; SR = LAS self-related.

Figure Caption

Figure 1. Results of multitrait-multimethod confirmatory factor analyses.

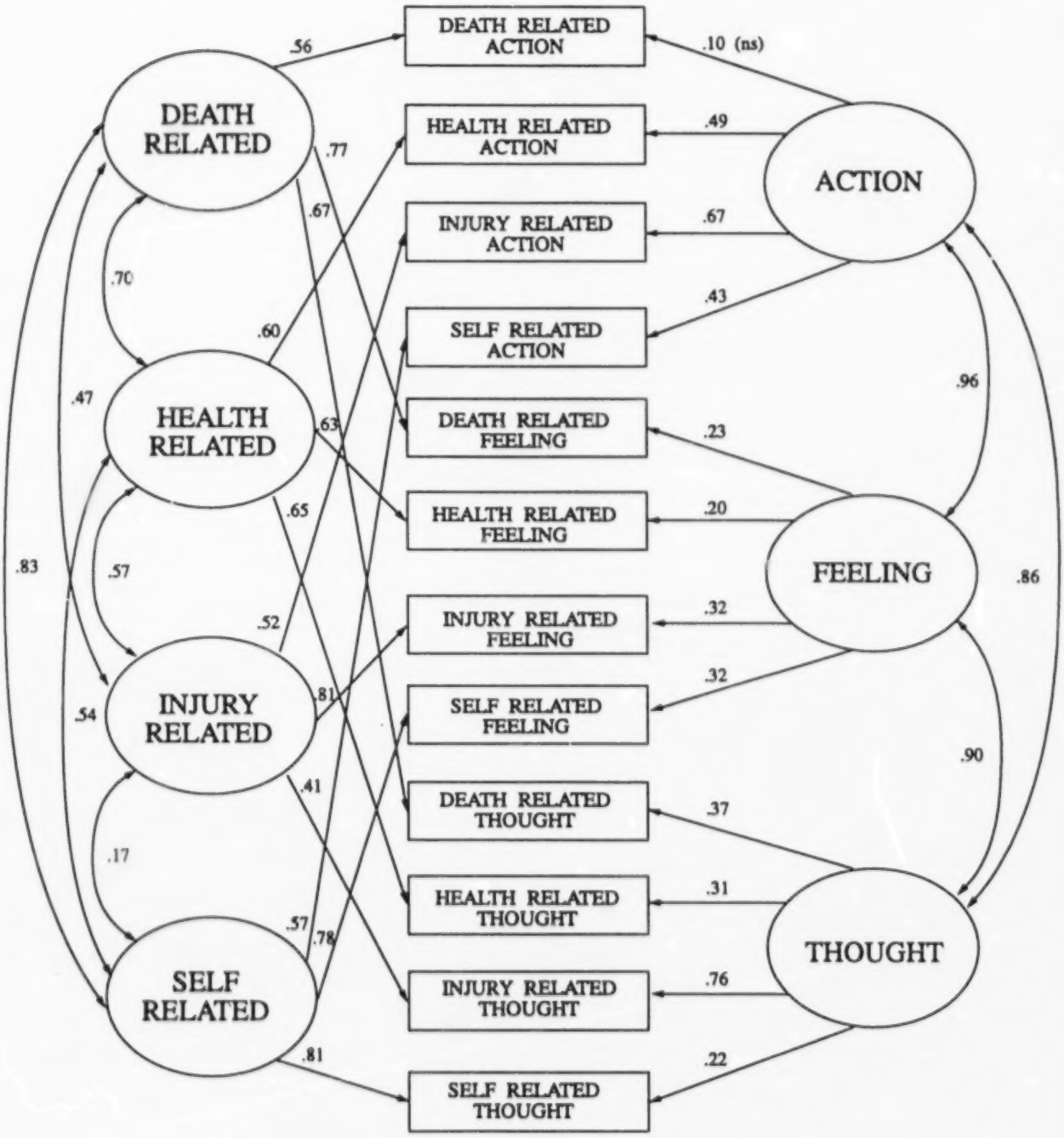

Figure 1. Results of multitrait-multimethod confirmatory factor analysis. Parameter estimates are standardized; ns = nonsignificant.